

WHAT IS CLAIMED IS:

1. A portable radio communication apparatus comprising a housing,

5 wherein at least one part of at least one of said housing is formed as a housing electrical conductor portion by an electrically conductive material,

wherein said housing electrical conductor portion is connected with a radio communication circuit of said portable radio communication apparatus so as to operate as at least one part of an antenna of said radio communication circuit, and

10 wherein said portable radio communication apparatus further comprises a boom portion coupled with said housing at least at two positions so as to provide at least one penetrating hole between said housing and said boom portion.

15 2. The apparatus as claimed in claim 1, wherein said antenna is an unbalanced type antenna.

3. The apparatus as claimed in claim 1, wherein said portable radio communication apparatus is a straight type portable radio communication apparatus.

20 4. The apparatus as claimed in claim 1, wherein said portable radio communication apparatus is a slide type portable radio communication apparatus in which an upper housing and a lower housing are slidable through a sliding mechanism, and

25 wherein at least one part of at least one of said upper housing and said lower housing is formed as a housing electrical conductor portion by an electrically conductive material.

5. The apparatus as claimed in claim 1,

wherein said portable radio communication apparatus is a folding portable radio communication apparatus in which an upper housing and a lower housing are foldable through a hinge portion, and

5 wherein at least one part of at least one of said upper housing and said lower housing is formed as a housing electrical conductor portion by an electrically conductive material.

6. The apparatus as claimed in claim 1,

10 wherein said housing electrical conductor portion is made by forming an electrical conductor layer on a dielectric housing which is at least one part of said housing.

7. The apparatus as claimed in claim 6,

wherein said electrical conductor layer is made by forming an electrical conductor pattern on said dielectric housing.

15 8. The apparatus as claimed in claim 6,

wherein said electrical conductor layer includes electrical conductor patterns different from each other on both surfaces of said dielectric housing, respectively, so that said antenna operates in a plurality of frequency bands.

20 9. The apparatus as claimed in claim 6,

wherein said electrical conductor layer includes a plurality of electrical conductor portions having electric lengths different from each other, respectively, so that said antenna operates in a plurality of frequency bands.

25 10. The apparatus as claimed in claim 6, further comprising one of a slot and a slit which are formed in said electrical conductor layer.

11. The apparatus as claimed in claim 4,

wherein said upper housing includes an upper first housing portion and an upper second housing portion, and

wherein at least one of said upper first housing portion and said upper second housing portion is formed as a housing electrical conductor portion by an electrically conductive material so that said housing electrical conductor portion operates as at least one part of the antenna of the portable radio communication apparatus.

12. The apparatus as claimed in claim 4,

wherein said lower housing includes a lower first housing portion and a lower second housing portion, and

wherein at least one of said lower first housing portion and said lower second housing portion is formed as a housing electrical conductor portion by an electrically conductive material so that said housing electrical conductor portion operates as at least one part of the antenna of the portable radio communication apparatus.

13. The apparatus as claimed in claim 5,

wherein at least one part of said hinge portion is formed as a hinge electrical conductor portion by an electrically conductive material, and

wherein said hinge electrical conductor portion is connected with the radio communication circuit of said portable radio communication apparatus so as to operate as at least one part of the antenna of said radio communication circuit.

14. The apparatus as claimed in claim 5,

wherein at least one part of said hinge portion is formed as a hinge electrical conductor portion by an electrically conductive material

so that said hinge electrical conductor portion operates as a parasitic element of the antenna of said radio communication circuit.

15 15. The apparatus as claimed in claim 13,
 wherein said hinge portion is made to be rotatable in at least
5 biaxial directions.

16. The apparatus as claimed in claim 13, further comprising
an electrically insulating layer formed on said hinge portion.

17. The apparatus as claimed in claim 1, further comprising:
a plurality of reactance elements having a plurality of reactance
10 values different from each other, respectively; and

a switching device for selectively switching over said plurality of
reactance elements so as to connect selected one of said reactance
elements with said housing electrical conductor portion.

18. The apparatus as claimed in claim 13, further comprising:
15 a plurality of reactance elements having a plurality of reactance
values different from each other, respectively; and

a switching device for selectively switching over said plurality of
reactance elements so as to connect selected one of said reactance
elements with said housing electrical conductor portion through said
20 hinge electrical conductor portion.

19. The apparatus as claimed in claim 17,
 wherein said switching device selectively switches over said
plurality of reactance elements in accordance with whether said portable
radio communication apparatus is in either one of an open state and a
25 closed state thereof.

20. The apparatus as claimed in claim 17,

wherein said switching device selectively switches over said plurality of reactance elements in accordance with a plurality of operating frequency bands of said portable radio communication apparatus.

5 21. The apparatus as claimed in claim 17,

wherein said switching device selectively switches over said plurality of reactance elements in accordance with either one of transmission and receiving of said portable radio communication apparatus.

10 22. The apparatus as claimed in claim 1,

wherein said housing electrical conductor portion is made of one of a dielectric material and a magnetic material, and

wherein said housing electrical conductor portion is connected with said radio communication circuit through an electrical insulator
15 having a predetermined capacitance so that a radio signal from said radio communication circuit is fed through the capacitance of the electrical insulator to said housing electrical conductor portion.

23. The apparatus as claimed in claim 1, further comprising a thin-film-shaped electrically insulating sheet formed on the upper
20 housing having said housing electrical conductor portion, said thin-film-shaped electrically insulating sheet being made of one of a dielectric material and a magnetic material.

24. The apparatus as claimed in claim 1,

wherein said boom portion is coupled with said housing so as to
25 be laterally symmetric relative to a width direction of said portable radio communication apparatus.

25. The apparatus as claimed in claim 1,
wherein at least one part of said boom portion is made of an
electrically conductive material.

26. The apparatus as claimed in claim 1,
5 wherein at least one part of said boom portion is made of a
flexible dielectric material.

27. The apparatus as claimed in claim 1; further comprising at
least one antenna element provided in said boom portion and connected
with said radio communication circuit.

10 28. The apparatus as claimed in claim 27, further comprising a
further switching device for selectively switching over between at least
one antenna element connected with said radio communication circuit
and said antenna including said housing conductor portion.

29. The apparatus as claimed in claim 1, further comprising a
15 plurality of antenna elements provided in said boom portion, said
plurality of antenna elements being connected with said radio
communication circuit, and having electric lengths different from each
other, respectively.

30. The apparatus as claimed in claim 1, further comprising an
20 external antenna provided in said housing.

31. The apparatus as claimed in claim 30, further comprising a
still further switching device for selectively switching over between said
external antenna and the antenna including said housing conductor
portion.

25 32. The apparatus as claimed in claim 1, further comprising a
built-in antenna provided in said housing.

33. The apparatus as claimed in claim 32, further comprising a still further switching device for selectively switching over between said built-in antenna and the antenna including said housing conductor portion.